

Since then I have met with two instances of the same kind in the skulls of Marsupials. The first of these I detected in the skull of an apparently adult *Macropus giganteus* in the Museum of the Royal University of Ireland. In this case the bone was only recognizable on the right side as a distinct ossification, while on the left the suture between it and the lachrymal had disappeared. The second instance I found in the skull of an adult Wombat (*Phascolomys platyrhinus*) in the Natural History Museum of Queen's College, Belfast. Here the bone was well-developed on both sides of the skull, and distinctly separated by suture from the frontal, nasal, maxilla, and lachrymal. It is worthy of note that, in his memoir on the 'Modifications of the Skeleton in the Species of *Phascolomys*,' the late Sir Richard Owen does not seem to have recognized this pair of bones, notwithstanding that they are clearly displayed in more than one beautiful figure of the skull by his artist, Mr. Smit.

The occurrence of such bones in Mammals so far removed from one another as a Lemur, a Hippopotamus, and two Marsupials suggests the probability of their being less uncommon in the mammalian skull than would at first appear, and I have little doubt that any naturalist who possesses the requisite time and opportunities for conducting the research in a large osteological museum would add to the list of such instances.

### 3. On the Species of the Genus *Mus* inhabiting St. Kilda.

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(Plate IX.)

The existence of any wild species of Mouse on the isolated rock of St. Kilda is an occurrence so apparently unlikely, that when in 1895 a specimen of a *Mus sylvaticus*-like species was found amongst some examples of *Mus musculus* sent thence to the British Museum in spirit, it was received with an amount of surprise certainly equal to the importance of the discovery. The specimen, a young male, had been obtained and was presented to the Museum by Mr. J. Steele Elliott<sup>1</sup>. It was a very remarkable one, and bore unmistakable evidence of having come from an out of the way part of the world. Its characteristics were a larger foot and a smaller ear than the corresponding organs of typical *Mus sylvaticus*, while, what was no less noticeable, the very characteristic snow-white colour of the belly of our common Field-Mouse was in this individual replaced by a uniform rufous hue shading imperceptibly

<sup>1</sup> Mr. Steele Elliott appears to have been the first person to collect specimens of the Mice of St. Kilda. The occurrence there of mice of some sort was, however, known previously to the outer world, and Seton states that "A cat is to be seen in almost every cottage, the mouse being the only wild animal on the island, and rats are still unknown" ('St. Kilda, Past and Present,' 1878, p. 132).

through the flanks to the peppery reddish-brown of the upper surface.

All these peculiarities seemed to clearly point to a new species or subspecies of Mouse; but the animal having been in spirit, its colour was regarded as unsatisfactory, and the unusual proportions of its ears and tail were ascribed to individual variation. And so the specimen was put on one side in the hope that in due time further examples might be procured.

Early in the spring of the present year I happened to come across the specimen, and, being greatly struck by its remarkable appearance, I at once endeavoured to procure some more of these St. Kilda Mice, with the result that my friend Mr. Henry Evans, during the course of a yachting cruise among the Scotch Islands, put in at St. Kilda and landed some traps for me on the island. Thanks to Mr. Evans, I have now before me, in addition to Mr. Steele Elliott's specimen, a fine adult pair, male and female, as well as a young female, of the St. Kilda Mouse, all sent down in spirit.

The dimensions, in millimetres, of these St. Kilda Mice are as follows :—

	Head and body.	Tail.	Hind foot.	Ear.
♂ (skin: J. Steele Elliott, 1894; Brit. Mus. Coll. no. 94.7.16.1) }	81	85	25	—
♂ (skin: H. Evans, 1898; Coll. G. E. H. B.-H. no. 556) ..... }	107	91	24.5	17
♀ (spirit: ditto; ditto) .....	110	94	24	15
♀ ( „ juv.: ditto; ditto) ...	82	77	24.5	15.5

They are thus remarkably large mice for typical *Mus sylvaticus*, and the adults equal in size the largest measurements of the form known as *Mus flavicollis* Melch. The skull of the adult male is as large an example as I have ever seen, reaching a total length of 29 mm.

The following list of total lengths of the skulls of various *sylvaticus*-like forms will illustrate this point :—

	mm.	
<i>M. flavicollis</i> , <sup>1</sup> ♂ .....	29	Suffolk.
„ ♂ .....	28 (W. 264)	Hereford.
„ ♂ .....	27 (W. 137)	„
„ ♀ .....	28 (A. 28)	„
„ .....	28 (W. 75)	„
<i>M. hebridensis</i> , ♂ (type) ..	27	
<i>M. sylvaticus</i> (old) .....	26 (W. 10)	
„ (in general) ..	26 to 27.	

In form and proportions these mice resemble *Mus hebridensis*,

<sup>1</sup> The majority of these specimens have been placed at my disposal by my friend Mr. de Winton, and the numbers appended are those affixed to them in his collection.

the form of *M. sylvaticus* described by my friend Mr. W. E. de Winton<sup>1</sup> from the Isle of Lewis, Outer Hebrides. The adult female from St. Kilda (which is in spirit) may possibly not be so stout in foot nor so small in ear as the Hebridean Mice, but the two forms are very close to each other, and there can be no doubt that the St. Kilda Mice belong to the Hebridean type, although their rufous belly has carried them a little further along the same line of development in which *Mus hebridensis* deviates from typical *sylvaticus*. In this respect I find that the most rufous skin of all is the first one collected by Mr. J. Steele Elliott. In it there is no perceptible line of demarcation between the colours of the upper and under surfaces, the transition from the one to the other being, as stated above, quite gradual. As regards the specimens obtained for me by Mr. Evans, the colour of the belly of the adult female, which is in spirit, agrees with that of Mr. Steele Elliott's specimen; but in the male, which has been made into a skin, the belly is slightly lighter, the median broad buff belly-line of *Mus hebridensis* is more evident, and there is a just perceptible line of demarcation between the colours of the two surfaces. The colour of the upper surface of the body of all the specimens is also, as in *Mus hebridensis*, more evenly distributed than in typical *sylvaticus*, there being less tendency to the development of a dark dorsal line.

It is exceedingly interesting to find this graduating series, and to have the gap between *Mus sylvaticus* and the St. Kilda Mouse partially bridged over by the occurrence of *Mus hebridensis* on the intervening islands.

This slight variation of the St. Kilda specimens in regard to the colour of the belly, the white colour of which is so extremely constant in and characteristic of *Mus sylvaticus*, is worthy of note, being exactly what we should expect to find in a comparatively new species which has not yet finally settled down into its new groove of development. We thus find that while in the colour of the belly some of the St. Kilda Mice may vary in the direction of *Mus hebridensis*, it is in this very respect that the latter form may vary in the direction of *Mus sylvaticus*. Indeed, in this regard *Mus hebridensis* is very variable, and I have examined some Isle of Lewis specimens, especially those from the eastern coast, which come very close to *Mus sylvaticus* in the colour of the underside.

In addition to the above mice, Mr. Evans also procured for me five specimens of the House-Mouse of St. Kilda, of which the Museum already possessed five specimens collected on previous occasions and now preserved in spirit. These mice are, if possible, of even greater interest than the *Mus sylvaticus*-like species, since they are characterized by the possession of a buff-coloured underside clearly marked off from the colour of the upperside by a distinct line of demarcation, and are thus very different from the ordinary almost uniformly smoky-brown-coloured House-Mice

<sup>1</sup> Zool. 1895, p. 369.

with which everyone is familiar. The upper surface is not of the typical smoky *musculus* tint, but of a sepia-brown with a grizzled appearance, due to many of the hairs being tipped with rufous. The lower parts of the hairs are exactly of the same shade as in *Mus sylvaticus*, for a dark specimen of which, at a casual glance from above, the animal might almost be mistaken. All these mice—even the very young ones—agree in presenting similar characters, and altogether are quite the most distinct local form of *Mus musculus* which I have ever examined.

In form and proportions these mice are well-developed large House-Mice, only differing in this respect from ordinary mice in being above the average size. The dimensions of the series which I have been able to examine are as follows (in millimetres):—

		Head and body.	Tail.	Hind foot.	Ear.	
♀ skin (suckling: Coll. G. E. H. B.-H. no. 534)		90	85	17	14	1898.
♀ (spirit)       "       "		88	81	15	12	
♀       "       "       "		78	79	15	12·5	
♀       "       .....		87	84	16·5	13	
♀ (spirit), suckling .....		83	78	18	13	Brit. Mus. Coll. nos. 94. 7. 16. 2 & 3, presented by Mr. J. Steele Elliott through Mr. J. E. Harting.
♀       "       "       .....		85	85	17·5	13	
♂ (juv.) (spirit) .....		75	65	16	10	Brit. Mus. Coll. no. 96.8.6.1, presented by the Kelvin- grove Museum.
♀ (spirit), very young ...		52	52	14	10	1898.
—       "       "       ...		65	67	15	10	Brit. Mus. Coll. nos. 94. 7. 16. 2 & 3 (duplicate), presented by Mr. J. Steele Elliott through Mr. J. E. Harting
—       "       "       ...		53	60	16	10·5	

The arrangement of the mammae is as in *Mus musculus*, there being 10 pairs in all, of which three are pectoral and two inguinal.

The skulls and dentition of these mice are in general appearance and size very *musculus*-like in character, but the triangular narrowing of the internal opening for the nostrils is even more strongly marked than in ordinary specimens of *Mus musculus*. All the St. Kilda skulls possess this peculiar narrowed palate, a character which I can only find in one out of over fifty specimens of *Mus musculus*-like Mice in the British Museum collection, and that one is a specimen of the subspecies *Mus musculus jalapae* Allen and Chapman, from Mexico. The greatest lengths of four skulls from St. Kilda are 22, 22·5, 23, and 23 millimetres.

It is obvious that, according to the custom of modern naturalists, these two forms of Mice need new names, which I therefore propose to give, leaving the question as to the exact status of the two new forms to be decided when we are in possession of a fuller knowledge of the other species or subspecies of Mice of the *musculus*- or *sylvaticus*-like groups. As to the desirability of bestowing names

on the two Mice from St. Kilda I can have no doubt whatever; but as to whether they are fit subjects for a binomial or for a trinomial treatment I am less certain, until I have had time to study the *musculus*- or *sylvaticus*-like Mice of the whole Palearctic Region. For many reasons it would seem convenient to apply the trinomial system to all forms which can be clearly shown to be local developments of any other form. By such a method a clue is given to the relationships of the various local forms—a matter of no small importance to the student of a large and difficult genus like that of *Mus*.

On the other hand, we have in the present instance two forms which, although obviously coming within the above definition, are perfectly isolated, and do not, so far as we know, intergrade with the parent form. Regarded from this point of view, they have as much claim to be accorded full specific rank as any other island species, and the latter is, perhaps, the most satisfactory method whereby to deal with them.

The following are the names which I propose :—

*MUS HIRTENSIS*, sp. nov. (Plate IX. fig. 1.)

Closely allied to *Mus hebridensis*, from which, however, it differs in its slightly larger size, as stated above, and also in the greater amount of buff or yellowish-brown coloration on the underside. Like *Mus hebridensis*, it differs from typical *sylvaticus* in the more uniform coloration of the upper surface of the body, in the absence of the clearly defined white underside, and in the longer feet and smaller ears.

The skull is similar to that of *Mus hebridensis*, but appears to be larger, equalling in size that of the largest specimen of *Mus flavicollis*.

The type is No. 94.7.16.1 (British Museum coll.), the young male first collected by Mr. J. Steele Elliott.

*MUS MURALIS*, sp. nov. (Plate IX. fig. 2.)

In shape and proportions allied to *Mus musculus*, but more robust and larger in size. In general colour of the upper surface resembles a dark specimen of *Mus sylvaticus typicus*, the base of the hairs being of the same colour as in that species, but having the extremities of the majority of a sepia-brown colour; mixed among these are a certain proportion of rufous-tipped hairs, which give the animal a grizzled appearance. The colour of the under surface is very remarkable, being buff, clearly separated by a well-marked line of demarcation from the colour of the upper surface of the body.

The skull, as compared with that of typical *Mus musculus*, is remarkable for the greatly exaggerated narrowness of the posterior opening of the nostrils.

The type is No. 534 of my own collection: it is an adult female procured for me in 1898 by Mr. Henry Evans.



The interest pertaining to these two Mice, which undoubtedly represent local developments of *Mus sylvaticus* and *Mus musculus*, will be better appreciated if I briefly discuss the variations to which these two species are subject in other localities.

I assume, however, from the outset that in neither case am I dealing with an animal which may have been recently introduced to the island. The great amount of variation from the type of a species which varies so little as *Mus sylvaticus*, as shown in the one case, and the evolution of a perfectly uniform and distinct type of coloration in one so variable as *Mus musculus* in the other, are both characters which would seem to have taken no inconsiderable time for their development. So that even if, as is probable, the presence of a *Mus musculus*-like species of Mouse on St. Kilda be due originally to a case of introduction, such an introduction could not have taken place at a very recent period in the history of the island, which is known to have been inhabited for at least several centuries.

The distribution of *Mus sylvaticus* is almost coterminous with the limits of the Palæarctic Region, the species only just reaching the confines of the Oriental Region "in Gilgit, where it is common from 5000 to 10,000 feet elevation" (Blanford, Faun. Brit. Ind., Mamm. p. 416). In the former region it is probably as widely spread as any other mammal, as it seems to be very regardless of the influence of temperature, and is found far up the slopes of the mountains. It is equally at home in all the countries (except probably the Arctic tundras and the great sandy deserts) from the eastern coast-line of China to the Atlantic. It has reached Morocco, Algeria, and Palestine, and has found its way to most of the Islands, such as those of the Mediterranean, the Channel Islands, Great Britain, Ireland, the Scotch Islands, the Shetlands<sup>1</sup>, and even Iceland, where the local form (*Mus islandicus* Thien.) is said to be the only indigenous species of mammal.

Its presence in such isolated, yet widely-separated, islands as Iceland and Corsica seems to mark it as a species which has for long maintained a wide area of distribution, and which had already occupied the greater part of its present range before these and the other islands where it is now found were finally separated from the continent as such, but still formed a part of the continuous Palæarctic land-area. And of its antiquity we have sufficient proof, for its bones have been found in numerous caves on the Continent and in the English Forest-bed (see E. T. Newton, Quart. Journ. Geol. Soc. vol. 1. pt. 2, no. 198 (May 1st, 1894), p. 195), and we have no trace of its ancestry, the Pleistocene species, *Mus orthodon* Hensel and *abbotti* E. T. Newton, being at least as specialized as itself.

Not only is *Mus sylvaticus* of exceedingly wide distribution, but

<sup>1</sup> A set of four from Dunrossness, for which I am indebted to Mr. Henderson, has recently reached me; I am unable to separate them from *Mus sylvaticus* of Western Europe and Great Britain, and the same remark applies to some specimens collected for me by Mr. W. Eagle Clarke on Alderney.

throughout the immense area where it is found it remains remarkably constant to a single well-marked type. Throughout the Palearctic Region it is distinguishable at a glance from every other Mouse with which it might possibly be confounded by the pattern of its teeth, its long foot, large ears, and pure white belly, separated from the rufous colour of the upperside by a strong and clearly-marked line of demarcation. It is true that these peculiarities show a slight tendency to local variation, so that two or three local forms of *Mus sylvaticus* may be recognized; but the variation is so slight that it takes a specialist to distinguish *Mus chevrieri* M.-Edw., of Tibet and China, from *Mus arianus* Blanf., of Persia and Afghanistan, or *Mus sylvaticus* Linn., of Europe.

Within the confines of Europe the animal seems to hold quite firmly to one particular type, so that I am unable to distinguish specimens obtained in Corsica from those of Ireland or France.

*Mus sylvaticus* is, then, obviously a species which in its long-standing and successful struggle for existence has attained to a height of specialization from which it has either very little power of variation, or else which is such as to fulfil all the needs of the species in almost any conditions with which it may be brought into contact. It is a species which further and even minute study may find unprofitable, or even impossible, to split into local subspecies. Not that I wish to imply that local variations are absent or even rare in *Mus sylvaticus*: they are by no means so, but their presence is infinitely less abundant or conspicuous than is the case with other and perhaps equally wide-spread mammals.

It is also extremely interesting to find that the representatives of *Mus sylvaticus* in the Hebrides and St. Kilda show as much divergence from the type as examples from any other locality with which we are acquainted, and it is an evident sign of the antiquity of the animal at St. Kilda, and a seemingly irrefutable argument against any theory of its introduction into the island—apart from the fact that its presence in the Channel Islands, in Iceland, Norway and Sweden, the Shetlands, Ireland, and the Inner and Outer Hebrides marks it out as the species *par excellence* of all others in the Palearctic Region which we should most expect to find in such an out-of-the-way island. And to judge by its large size and robust form, it has had no difficulty in maintaining its existence on St. Kilda.

I therefore think that we have a good deal of evidence to support us in supposing that *Mus hirtensis* is indigenous to St. Kilda, and indeed the very position of this rock, facing as it does the Western Hebrides and with a channel of no very great depth between it and them, throws no difficulty in the way of the hypothesis that the continuous land-area which enabled *Mus sylvaticus* to reach the Shetlands, Scotland, the Hebrides, and Ireland, should have included also St. Kilda in its surface, a state of things which might be produced by an elevation of about 60 fathoms only.

That such a land-connection must have been of geologically quite recent date is a matter of no difficulty for a zoologist,

since the whole of our British Mammalian fauna is so similar to that of the Continent that it is inconceivable (unless *all* the species are introductions) that it can have existed in our islands for any, geologically speaking, long period of time. Even the most plastic of British Mammals, such as the Squirrel<sup>1</sup>, have only advanced a comparatively short distance on the road of differentiation; and as regards Birds there is a precisely similar story to be told, there being only one really well-differentiated peculiar British species, the Red Grouse, *Lagopus scoticus* (Lath.). In fact, one of the strongest arguments against my friend<sup>2</sup> Dr. R. F. Scharff's brilliant theories as to the antiquity of the Irish fauna (which is presumably older than that of Great Britain) is that, were it so old as he would make it, we should expect to find not only peculiar species but even peculiar genera among the mammals of Ireland, whereas a most careful study has hitherto only sufficed to distinguish one certainly peculiar species, the Irish Stoat, *Putorius hibernicus* Thom. & H.-B., and that bears in itself very clear evidence of its recent origin. Another species or subspecies, the Irish Hare, *Lepus hibernicus* Bell, seems also to be distinguishable, but it is not nearly so distinct as the Stoat. Among Birds, Reptiles, and Amphibians naturalists have hitherto failed to find any peculiar local forms, although it is evident that the Grouse of Western Great Britain and of Ireland is following the same route as the Irish Stoat and Hare.

Can there, then, be any great difficulty in supposing that *Mus hirtensis* is indigenous to St. Kilda, and that it reached the island at a comparatively recent geological period, when a land-surface existed connecting the Shetlands, Orkneys, Scotland, the Hebrides, St. Kilda, and Ireland, and that this connection must have been so recent geologically that few of our native mammals have had time to develop into species or even subspecies distinct from those of the Continent of Europe? That the Mouse of St. Kilda should be the one in which variation has proceeded farther than in other localities is quite in accordance with the isolated situation of and confined space on the rock, together with its full exposure to the Atlantic winds; and we have an apparently parallel instance in the case of the Wren of the island, *Troglodytes hirtensis* Seebohm, and perhaps also in the possible existence of a race of small dark-coloured Field-Mice<sup>3</sup> in the West of Ireland.

To assert that the Mouse of Iceland has reached that island along a formerly continuous land-area would be a very different matter, since not only is there a deep channel between the Faroes and Iceland, and even between the former islands and the Shetlands, but if we consider that *Mus islandicus* is native to Iceland, then we should expect to find a similar or representative species in the Faroes, and of that we have as yet no record.

Yet that there has *never* been such a land-connection will not,

<sup>1</sup> *Sciurus leucourus* Kerr.

<sup>2</sup> See Proc. R. I. Acad., July 1897, p. 427.

<sup>3</sup> See Jenyns, Ann. & Mag. Nat. Hist. vol. vii. p. 268 (1841).



I suppose, be contended by anybody, so that the question in reality resolves itself into one dealing with the time at which such a connection existed, and whether it has been sufficiently recent to allow of a passage along it of such a presumably recent mammal as a Mouse. Although we cannot expect to decide such questions from a mammalian point of view alone, it is profitable to remember that such "an old land extension connecting Greenland, Spitzbergen, and Scandinavia with Scotland and Ireland" is relied upon by the Editors of the recently published second edition of the 'Cybele Hibernica' (Introduction, pp. li & lii) as the only reasonable explanation of the presence in Ireland, and undoubtedly native there, of three plants of North-American habitat, two of which are unknown in Continental Europe; nor would there seem to be any better explanation forthcoming to account for our share in Ireland of certain Invertebrates which are indistinguishable from North-American forms<sup>1</sup>.

Similarly Mr. A. H. Keane<sup>2</sup>, although writing on a widely different subject, regards the "submarine bank which stretches from Scotland through the Faroes and Iceland to Greenland" as representing "a vanished Continent of great age, which would appear to have still formed dry land in late Tertiary times."

But the present paper deals not with the question of a submerged Euro-American Continent, but with the Mice of St. Kilda, and I must content myself with pointing out in conclusion that the recent exploring expedition to Rockall<sup>3</sup>, the most westerly rock-islet off the European Continent, found that when trawling at a distance of about 15 miles south of that rock, "the water shoaled to 80 fathoms, and there was brought up in the bag a most unexpected assortment of shallow-water shells, evidently long since dead. Amongst these were several kinds of *Pecten*, *Venus casina*, *V. fasciata*, *Mytilus modiolus*, &c." In the words of the Rev. W. S. Green, "How, under present conditions, such shells could be found living anywhere on the bank was difficult to understand. It would seem to afford the strongest confirmation to the theory that the time is not so very long distant when there was more land, with a shallow coast-line, and possibly extensive sand-banks, where now the pinnacle of Rockall is the only speck acting as a memorial stone to what tradition has called the 'Sunken Land of Buss.' After the shallow sand-banks had vanished, these mollusks may have accommodated themselves to a deeper sea than is usual for such organisms to live in, and it may be that it is only now that the conditions are becoming too severe for their further existence. There is, of course, the possibility that these shells may have come from the bottom of icebergs which had grounded in Greenland or Spitzbergen bays, but I doubt if in times sufficiently recent such bergs have visited the position occupied by Rockall, and therefore the former theory seems the more probable.

<sup>1</sup> See 'Irish Naturalist,' iv. pp. 25, 122; vi. pp. 225, 257.

<sup>2</sup> 'Ethnology,' 1896, p. 231.

<sup>3</sup> See Trans. R. I. Acad. vol. xxxi. pt. 3, pp. 45-46 (1897).

"The possibility of the shells having been brought as bait for the lines of the fishing-boats visiting the bank is, I think, disposed of by the mixed character of the deposit, some of the shells being unsuitable for such a purpose. It would be interesting to trace out the area occupied by these dead shells, and, possibly, to search in a similar manner for the lost land of Hy Brassil on the Porcupine Bank, but the time at our disposal only gave us the chance for one dip into this deposit."

Turning to *Mus musculus* we have to deal with a very different species, and I do not in this case attempt to prove that this animal has reached St. Kilda without the help of man. That it must have existed there for a considerable time, perhaps for hundreds of years, is, however, as I hope to show, very probable. Well known and widely spread in almost all regions where the habitations of man afford it a refuge, it is impossible to state what is the native home of the species. Not only is the domestic form of *Mus musculus* widely spread and readily susceptible of introduction into the houses of its unwilling protector, man, but its variability is as remarkable as is the constancy to type of *Mus sylvaticus*. Still it has never, I believe, been asserted that the species is anything but an introduction into Western Europe and the British Islands.

Light or yellowish varieties of *Mus musculus* have from time to time received names, such as *M. hortulanus* Nordmann, *M. nordmanni* Keys. & Blasius, *M. flavescens* Fisher, and *M. flaviventris* Lataste; the last two names preoccupied by other species of the genus. In addition, however, to these almost domestic members of the *Mus-musculus* group of Mice, we have in many parts of the world wild forms of Mice which, though differing to a greater or less extent in their size, length of tail and colour, cannot be distinguished from *Mus musculus* in their skull and teeth. Such Mice are *M. bactrianus* Blyth and *M. gentilis* Brants, which are widely distributed in the deserts respectively of Asia and N. Africa, and *M. wagneri* Eversm. (= *M. pachycereos* Blanford) of Central Asia, the latter a true House-Mouse, often found inhabiting houses, and differing in no cranial characters from *Mus musculus* proper.

Lastly we have a set of Mice also of varied colours, size of body, and proportion of tail, but mostly characterized by the possession of a white belly, which are found in many of the regions where typical *Mus musculus* occurs. Such are *M. spretus* Lataste, of the Barbary States, and *M. spicilegus* Petenyi, of Hungary, France, Portugal, and Western Europe. These mice may occur in close proximity to the typical *Mus musculus*, as was found by Mr. Oldfield Thomas in Portugal and by myself in Morocco.

Among all these perplexing forms it is indeed difficult to assign a proper place to *M. muralis*, and more so to hazard even a guess as to the possible origin of the domestic races of *Mus musculus*. We know, however, that almost wherever there are deserts there a *bactrianus*-like Mouse is found, so that *M. bactrianus* is perhaps as widely distributed in deserts as is *Mus musculus*.

*typicus* in houses. It seems to me, therefore, probable that both *Mus bactrianus* and *Mus musculus* are developments of some original parent form to suit particular conditions, and we may perhaps look for the latter to some Central Asian species like *M. wagneri*.

Some of the white-bellied forms which are found in a wild state in Western Europe and in other countries where *Mus musculus typicus* occurs in houses may be cases of reversion from the latter, which is no doubt almost certainly the origin of such races as are found on islands, such as the Salvage Islands, where the Mice must have been accidentally introduced. But it by no means follows that this is the case with *Mus spicilegus*, the size and proportions of which are so much finer than in true *Mus musculus* and the tail shorter. *Mus spicilegus*, indeed, might even be regarded as a wild parent form of *Mus musculus*; hence it is not with it, but the forms which are certainly reversions from true *Mus musculus*, that we must associate *Mus muralis* of St. Kilda, and it is interesting to note that the similarly derived Mice of the Salvage Islands resemble those of St. Kilda very closely in their robust form.

That a wild race of *Mus musculus* can be rapidly evolved from Common House-Mice when living in a wild state has been recently shown by my friend<sup>1</sup> Mr. H. Lyster Jameson, who has clearly made out his case for the formation of an incipient species of Mouse on the North Bull, Dublin Bay, Ireland, a tract of sand-hills about three miles in length and almost completely isolated from the mainland.

It is known that this sand-bank has not been in existence for more than about 100 years, so that the coloration described by Mr. Jameson must have been evolved in at most a period of that length.

Mr. Jameson lays great stress on the value of the change to these mice as a protective feature, and so he has not, I think, given sufficient emphasis to the fact that we have here a clear instance of the development of an incipient subspecies of Mouse with an exact period laid down in which the change occurred, and we may fairly, I think, use Mr. Jameson's results in dealing with other species or subspecies of Mice.

If we are to judge from the analogy of Mr. Jameson's mice, we must conclude that the Mice of St. Kilda have inhabited that island for a considerable time. Not only are they more distinct in colour than any other local form of *Mus musculus* with which I am acquainted (and I have been through the whole of the specimens in the British Museum Collection), but their line of development seems to have become fixed, and is no longer, as in the case of Mr. Jameson's mice, in a state of uncertain evolution. On the North Bull sand-hills, indeed, Mr. Jameson found not only mice which had progressed for a considerable distance along the path of their new development, but also mice which showed every kind

<sup>1</sup> Journ. Linn. Soc., Zool. vol. xxvi. pp. 465-473: "On a probable Case of Protective Coloration in the House-Mouse (*Mus musculus*, Linn.)."

of gradation from those which had white bellies to those which exhibited the characters of perfectly typical *Mus musculus*.

I think, then, that we may safely conclude that *Mus musculus* is of at least several hundred years' standing at St. Kilda.

There is one extremely interesting point which should not be forgotten in connection with these two St. Kilda Mice, namely the fact that we have here a clear opportunity of studying the effect on two distinct species of the same genus of isolation side by side on the same island. Here we have on a circumscribed area two species in the course of evolution, the progress of which may be easily studied from time to time. The species having now been described, we may be able in 20 or 30 years' time, by comparing specimens taken then and now, to estimate the amount of change which they will in that time have undergone. It is interesting to note, however, that so far the effect of isolation on the island is not similar in the case of the two species, since apparently the Mouse which must be supposed to have been the longer time at St. Kilda is the very one which has varied in a lesser degree than that which we must regard as an introduction. For *Mus hirtensis*, which appears to have been on St. Kilda since that island was in connection with the mainland, is certainly not much more different from *Mus sylvaticus* than is *Mus muralis* from *Mus musculus*, yet *Mus muralis* can only be an introduced species of at most a few hundred years' standing. Nothing can give stronger emphasis to the fact that different species possess different powers of variability and follow a different course of evolution, so that it seems that we cannot predict what will happen under certain circumstances to one species from our experience of what has happened to another. Every species, it would appear, has its own modes of evolution and development, which are peculiar to it and to it alone.

#### EXPLANATION OF PLATE IX.

Fig. 1. *Mus hirtensis*, p. 81.

Fig. 2. *Mus muralis*, p. 81.

4. Notes on the Internal Anatomy of *Notornis*. By W. BLAXLAND BENHAM, D.Sc., M.A., Professor of Biology, University of Otago, Dunedin, New Zealand.

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Early in August of the present year, 1898, I had the opportunity of examining the anatomy of that rare flightless Rail, *Notornis mantelli*, of which only three previous specimens had been obtained during the last 50 years, so that it has been regarded by European zoologists as probably extinct. Thus Gadow says, in Bronn's 'Thierreich': "kürzlich ausgestorben" (Systematic part, p. 182).

The previous specimens did not reach the hands of naturalists in a condition fit for examination, but this fourth one arrived in a